Wicked Problems

WICKED PROBLEMS
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Initially proposed by Rittel and Webber in 'Dilemmas in a General Theory of Planning' (1973), the idea of 'wicked problems' would soon imprint the development of design beyond the materialization of artifacts of industrial production. This movement was accompanied by the expansion of new interdisciplinary fields of research, inspired by the idea of 'complexity' within studies of cognition, cybernetics, biology, systems theory and organizational sciences. Taking into account current ecological, social and economic instability – now considered inseparable due to their inherent entanglements –, the idea of 'wicked problems' appears as a pertinent framework when attempting to work with various challenges. Whether we consider the depletion of resources, the exploitation of labor in the production of various gadgets or the monopolization of trends and patterns of production, the idea of working with 'wicked problems' questions the ultimate role of design as a promoter of material 'progress'.

In fact, some designers and technologists would rather see their work as a response to questions of interconnection, sustainability, openness and community participation. This is visible in the work of designers such as Natalie Jeremijenko, the 'Open Sailing' project, the 'AfriGadget' grassroots report, the collaborative architectures of the 'Urban Prescriptions' group, or the work of the 'Preemptive Media' group. These designers, collectives and projects and the challenges they carry are not only relevant to those involved in forms of craft-based, industrial and post-industrial production. They also call into question the nature of knowledge produced by those who design as well as the role of education, research and the structure of art/design education more broadly. As a consequence, this entry proposes that 'wicked problems' instigate the development of research agendas that require new concepts, potentiating the generation of novel design practices and figurations of multiple arrays of design knowledge.

Writing on the topic of 'depletion design' will require a train of thought that goes to the core of the small word 'design' and the challenges that are presented to this field of practice in all its manifestations (e.g.: industrial design, environmental graphic design, interaction & media design, etc.). The intention is not to provide any prescription to those involved in the conceptualization of artifacts but to discuss some of the dimensions and significance of the topic proposed in this issue. Whether one focuses on the exhaustion of raw materials or the ever-expanding notion of 'network ecology', one is immediately caught-up with the multi-various ways in which every single design – from the microchip to the extensions of social media – matters. They 'matter' not only because there is a source of precious material substance at stake – minute as it might be – but also since each blueprint underlies a range of entanglements – environmental, social, economic and political.

In 'A Cautious Prometheus? A Few Steps Toward a Philosophy of Design' (2008), the science and technology studies (STS) scholar Bruno Latour elucidates this point: 'the typically modernist divide between materiality on the one hand and design on the other is slowly dissolved away. The more objects are turned into things – that is, the more matters of fact are turned into matters of concern – the more they are rendered into objects of design through and through' (p.2). This supports the claim that the artifacts that compose our contemporary material culture are not only thought alongside the industrial ethos of efficiency but also for the ways in which they bear specific forms of power and authority (Winner 1986:19). This polarization goes to the root of Latour's distinction between 'matters of fact' and 'matters of concern'. While the first one is most often related to the analysis of artifacts devoid of context (e.g.: the machine's blueprint), 'matters of concern' allow us to assemble an artifact out of pieces that are culturally and ethically diverse, as well as historically situated. When using this lens in the analysis of the technosphere we recognize that it is 'thick' (Latour 2005:2) with complex artifacts that are not only efficient but also instigate diverse forms of communication, reunion, ignorance, exploitation, just to name a few possible synergies. In fact, this transition from 'matters of fact' to 'matters of concern' renders the idea of 'design' as a helpful concept, one that allows us to 'draw' things together: '(...) to think of artifacts in terms of design means conceiving them (...) as complex assemblies of contradictory issues' (Latour 2008:3-4).

Within the field of design this shift from 'matters of fact' to 'matters of concern' resonates with the work developed in some industrial circles of the 1960's, particularly when designers started to challenge the linear problem-solution model that seemed to distort the workings and makings of the profession. The linear model largely draws on the 'scientific method' imbued as it was in the workings of logical positivism: the idea that reality can be coherently apprehended through 'clarification' and 'rationality' many times in detriment of actual scientific advancement (Feyerabend 1985:85). In fact, at this point in history, some designers shared the intuition that a great many 'design problems' were ill informed, and where data appeared confusing and all the agents, ranging clients, decision makers, users and others that might be drawn into the design process seemed to have conflicting values (Buchanan 1992:15). Design theorist Horst Rittel and urban designer Melvin M. Webber first proposed this shift from a determinate methodological paradigm into one of indeterminacy when attempting to define design's actual problems or research hypothesis as 'wicked' (Rittel & Webber 1973). There are ten fundamental considerations when working with 'wicked problems' and they may be summarized as follows:

1. 'there is no definitive formulation of a wicked problem';
2. 'wicked problems have no stopping rule – there are no criteria for sufficient understanding because there are no ends to the causal chains';
3. 'the solutions given can never be considered 'true' or 'false' as in other disciplines but rather as 'good' or 'bad'';
4. 'there is no immediate and ultimate test of a solution to a wicked problem';
5. 'there is no opportunity to learn by trial-and-error when dealing with wicked problems – every attempt counts';
6. 'every wicked problem can be approached from various points of enquiry';
7. 'every wicked problem is unique';
8. 'every wicked problem is part of another and at times more complex wicked problem';
9. 'the ways in which one chooses to explain a wicked problem determines the nature of its resolution';
10. 'when dealing with wicked problems the aim is not the truth but to improve some characteristic of the world' (Rittel & Webber 1973: 161-166; Buchanan 1992:16).

The 'wicked problems' approach was stimulated by the intellectual temperament of the time, influenced as it was by 'systems thinking' and its intellectual source, the cybernetic movement (Rittel & Webber 1973:159). In fact, part of the research agenda of cybernetics (particularly its 'second-order') focused on the inter-disciplinary application of concepts such as 'feedback', 'circular causality', 'self-regulation', and 'dynamic construction of reality' (von Foerster 2003) where 'subject and environment are considered as one single circuit' (Brand et al. 1976). Here, it is important to take into account the 'wicked problems' previously described, particularly: point two ('wicked problems have no stopping rule – there are no criteria for sufficient understanding because there are no ends to the causal chains'); point six ('every wicked problem can be approached from various points of enquiry') and point eight ('every wicked problem is part of another and at times more complex wicked problem'). These points emphasize the cybernetic principles described above while positioning a 'design problem' within a given dynamic system. Despite the controversial popularity of cybernetics, drawn as it was towards the design of military intelligence, one of the founders of the movement, Norbert Wiener, continuously strived to interlink these new concepts with distinct social concerns (Eglash 2000).

Designing - a Politics of Possibility

Contemporarily this approach seems worth rescuing. In fact, Rittel and Webber's 'wicked problems', 'the way in which they challenge established social values and institutional frameworks', have been commonly associated with the issue of 'climate change' (Jordan et al. 2010: 4). Today, we recognize that this topic defies a linear form of analysis or any one-directional way of solving the problem – in all its complexity – with a smooth transition through 'recycling', use of 'biodegradable materials', 'eco- friendly devices' and a motto of 'design for the developing world'. In fact, some of these buzzwords have become impregnated with contradiction (Starr 2011) acquainted as they are with the challenges of projects such as the 'LifeStraw'. This mobile purification tool that appeared on the cover of the Cooper-Hewitt's exhibition 'Design for the Other 90%', has been simultaneously involved in a carbon trading polemic (ibid.). Where, and 'through the magic of carbon credits', since the Lifestraw company has found a way to exchange 'carbon for water' while donating 'LifeStraws' in Kenya and in exchange receiving credits that have a premium value since the technology is distributed in the 'third world' (ibid.).

In this example, one can witness the way in which the issue of 'climate change' has undergone a transition from a 'matter of fact' to a 'matter of concern'. In fact, the idea that the climate actually changes and that this might impact our life is no longer thought as a unique environmental problem but also as a cultural and political issue (Ross 1991) – one that is transforming the way we conceptualize mankind, our collective efforts and our relation to the planet at large (Hulme 2009). This has also opened a debate concerning our romanticization of a pristine 'nature' at the same time challenging environmentalists to abandon their technophobias. As suggested by ecologist Erle Ellis in 'Stop Trying to Save the Planet' (2009): our spaceship Earth is a *used* one, transformed as it is by our ancestors down to the Zinjanthropus (my own emphasis). According to French archaeologist, paleontologist and anthropologist Leroi Gourhan (1993:116), it was the capacity of our ancestors to place themselves outside their condition as a zoological species that truly marked the 'human' revolution. This revolution can only be reconsidered through the discovery of the Zinjanthropus in 1959 (ibid.). This being, not 'human' or primate was contradictory to all the beliefs of the time a toolmaker. Interesting enough, this 'being' had quite a small brain, placing less importance on this organ in our expansion from our zoological conditioning and more on our capacity to communicate and transform 'nature'. In this sense – and here using Ellis' own humorous words – "the environmental crises is no longer about recycling garbage, it is about making something good out of grandpa's garbage and leaving the very best garbage for your grandchildren" (Ellis 2009).

As Ellis connotes: This approach is in line with a 'post-natural environmentalism' (Ellis n.d), one that engulfs a range of researchers (Botkin 1990, Nordhaus & Shellenberger 2007) that continuously attempt to transform our limited – yet dominant – view of the natural world as something that can be isolated, objectively known and therefore kept in harmonic balance, untouched and confined to 'wilderness'. Here lies hidden a contradiction in terms as the cause of depletion – the design of the material fabrics that compose everyday life – will very probably appear as the most likely solution to the challenges we face. This takes us once again to point two: 'wicked problems have no stopping rule – there are no criteria for sufficient understanding because there are no ends to the causal chains'. Taking into consideration these causal chains and our entangled nature, finally it seems important to rescue 'design' from a complacence with 'branding and competitiveness' (Bonsiepe 2006:27). As Bruno Latour (2008) suggested, this "little word 'design'" is more powerful than that. In fact, it allows one to move from 'matters of fact' to 'matters of concern' while mobilizing a discussion that has techno-ethical dimensions.

To further illustrate this approach and always drawing on the 'wicked problems' presented earlier on, it seems relevant to present the idea of 'circular design'. And while there is much emphasis on recycling and use of salvageable material within sustainable design fields, these practices seem to simply slowdown the rate of environmental contamination and depletion as opposed to orchestrating any effective change within the current state of affairs (Braungart & McDonough 1998: 4). This process, one that interlinks with the idea of 'downcycling' (ibid.), takes into consideration that when we salvage a plastic bottle lid, melt and mix it with other plastics in order to produce a new material designers are only lowering the quality of the initial cap as it is mixed with other hazardous components. The second-life that is given to this material will very probably be the last one and the product will inevitably end-up in a landfill as useless and dangerous waste.

Thus, the difference between our ancestors, who were also toolmakers and technological beings, and us is that their waste could be delivered back to the system. This relates to the concept of 'originary technicity', characteristic of current discourse within the field of philosophy of technology and that can be understood through a close reading of Adrian Mackenzie (2002). Utilizing the work of Jacques Derrida and Bernard Stiegler, amongst others, MacKenzie further emphasizes the main thesis of Derrida: "The natural, originary body does not exist: technology has not simply added itself, from outside or after the fact, as a foreign body" (p.5), And further adds: "One tack we could take on this quasi- concept of originary technicity is to say that it concerns the status of the body as a body. It may not be possible to think of a body as such because bodies are already technical and therefore in some sense not self-identical or self-contained" (p.6).

On the contrary, contemporarily, we find that our waste, natural and technical, cannot be fully 'metabolized' (ibid.). Advanced around the same time as Rittel and Webber's 'wicked problems', this idea is in debt to the work of Swiss architect Walter Stahel and his sketch of a 'cradle-to-cradle' design. With beneficial consequences for resource management, job creation and a construction of a healthy economy, this approach was further developed by German chemist Michael Braungart and architect William McDonough. In their framework, design is guided by a systemic approach, one that envisions the transformation of designed products on various scales – from material composition and all the way to industrial processes of fabrication. Drawing a dynamic that is similar to the cybernetic ouroboros, this design pattern sustains the idea that products are like nutrients that have to be maintained within their technical cycles thus forming a circular loop (ibid.). The ouroboros or uroborus is a mythical figure that is usually depicted as a serpent that nurtures itself by feeding on its own tail. Referring to ideas of self-reflexivity, and circular thinking, this image is often applied to the analysis of a system that has potential to constantly re-create itself. This idea was popularized amongst the members of the second-order cybernetic movement (Combs et al. 2002: 31-47). In the case of a computational device, the hazardous materials that compose these objects (such as lead, mercury, chlorinated plastics and brominated flame retardants) (Unhelkar 2010) should be substituted whenever possible or maintained as 'products of service'. As the word indicates, these products should be lent at the same time inviting users to deliver them to the initial manufacturer once obsolete. A more radical example is Braungart and McDonough's proposal of eco-intelligent packaging that dissolves into a biosafe liquid, delivering nutrients to the soil (Newcorn 2003) or, in line with the idea of 'product service' described above, a 'fifth-class' postage system used solely for the purpose of delivering packaging to manufacturers (ibid.). With these examples in mind, the cradle-to-cradle design model urges designers to rethink the issue of resource depletion in far more radical ways than those that are guided by a motto of 'reduce, reuse, recycle' (the three R's); one that has potential to alter our artifacts on various scales from the design of synthetic materials, to manufacturing processes and the economy at large.

This circular way of thinking is not devoid of its contradictions. The 'Cradle to Cradle' framework has been appropriated by Braungart and McDonough and converted into a trademark – this raises obvious ethical questions. Even though some critics see this step as a crucial one in the maintenance of a certain degree of control and certification within a transitional phase in the design and fabrication of various artifacts, it seem fair to recognize that this framework should be converted into an independent norm such as ISO (EMF 2010). However, what is most important to retain, is that this mode of thought challenges a dominant view of design as an activity that delivers goods that are 'ephemeral, fashionable, disposable, aesthetical, and playful' in opposition to an initial conception of the field as 'intelligent problem solving' (Bonsiepe 2006:28). It allows one to move beyond the idea of sustainability in a way that salvages design's potential. Here it is important to take into account that the idea of sustainability can be misleading. In fact, one can practice sustainability while 'reducing, reusing and recycling' materials and still 'sustain' the same system of depletion that seems insupportable. What Braungart (2008) proposes is 'design as opposed to sustainability' since 'what we need is to provide nutrients as opposed to simply minimize waste'.

This transformation connects with point nine: 'the ways in which one chooses to explain a wicked problem determines the nature of its resolution'. In face of a world so overwhelmingly planned and fabricated, delivering back design, its potential to create 'self-reflexive' systems while accounting for all degrees of 'wickedness', allows one to move beyond a numbing-state of 'less intervention'. In fact, this state follows the pessimistic tendency to understand the environmental crises, its devastating cultural and socio-economic impacts, as rather too 'complex' and therefore impossible to resolve. Or, on the other hand, as a consequence of our 'demonizing' capacity to alter 'nature' to our own consent. It is true that current environmental affairs are in debt to the over-depletion of environmental resources, however, this relation is not unidirectional but rather intricate, varied, ever changing and full of contradictions. As a response: it seems that we have to continue designing, now with even more care than ever before.

Recommended Readings

Ellen MacArthur Foundation (EMF). 'It's all Good on Paper, But...', 2010, http://www.ellenmacarthurfoundation.org/explore-more/circular-economy/its-all-good-on-paper-but.

Greenpeace International (GI). 'Where Does E-Waste End Up?', 2009, http://www.greenpeace.org/international/en/campaigns/toxics/electronics/the-e-waste-problem/where-does-e-waste-end-up.

Lifestraw Family. 'How Carbon for Water Works', (n.d.), http://www.vestergaard-frandsen.com/carbon-for-water.

The Product Life Institute. 'Cradle to Cradle', (n.d.), http://www.product-life.org/en/cradle-to-cradle.

Bonsiepe, Gui. 'Design and Democracy', *Design Issues* 22 (2), Cambridge, Massachusetts: The MIT Press, 2006, pp. 27-34.

Botkin, Daniel. *Discordant Harmonies: A New Ecology for the Twenty-first Century*, Oxford University Press, 1990.

Brand, Stewart. 'For God's Sake, Margaret: Conversation with Gregory Bateson and Margaret Mead'. *CoEvolutionary Quarterly* 10, pp. 32-44, 1976, http://www.oikos.org/forgod.htm.

Braungart, Michael and McDonough, William. 'The Next Industrial Revolution', 1998, http://www.theatlantic.com/magazine/archive/1998/10/the-next-industrial-revolution/304695.

Braungart, Michael. 'Is Sustainability Boring?', 2008, http://www.dizajncafe.com/en/news/1/eco-design/40.

Buchanan, Richard. 'Wicked Problems in Design Thinking'. *Design Issues* 8 (2), Cambridge, Massachusetts: The MIT Press, 1992, pp.5-21.

Combs, Allan; Marks-Tarlow, Terry and Robertson, Robin. 'Varela and the Uroborus: The Psychological Significance of Reentry'. in Jeanette Bopry (ed), *Cybernetics & Human* Knowing 9 (2), Imprint Academic, 2002, pp.31-47.

Ellis, Erle. 'Stop Trying to Save the Planet'. 6 May, 2009, http://www.wired.com/wiredscience/2009/05/ftf-ellis-1.

__. 'Postnaturalism', (n.d.), http://ecotope.org/blogs/page/Postnaturalism.aspx.

Eglash, Ron. (2000). 'Cultural Cybernetics: the Mutual Construction of People and Machines', 2000, http://www.rpi.edu/~eglash/eglash.dir/cyb/cultcyb.dir/cultcyb.htm.

Fuller, Matthew. *Media Ecologies: Materialist Energies in Art and Technoculture*. The MIT Press, 2005.

Fuller, Matthew and Matos, Sónia. 'Feral Computing, from Ubiquitous Calculation to Wild Interactions', in Andrew Murphie (ed.) Interaction Designs for Ubiquity: Visible, Tangible, and Embedded. *Fibreculture Journal*: Digital Media + Networks + Transdisciplinary Critique, 19: Ubiquity, 2011, pp. 145-163.

Hulme, Mike. *Why We Disagree About Climate Change: Understanding Controversy, Inaction and Opportunity*, Cambridge University Press, 2009.

Jordan, Andrew; Huitema, Dave and van Hasselt, Harro. *Climate Change Policy in the European Union: Confronting the Dilemmas of Mitigation and Adaptation?* Cambridge University Press, 2010.

Latour, Bruno. 'A Cautious Prometheus? A Few Steps Toward a Philosophy of Design (with special Attention to Peter Sloterdijk)', 2008, http://www.bruno-latour.fr/node/69.

__. From Realpolitik to Dingpolitik – or How to Make Things Public', in Bruno Latour and Peter Weibel (eds), *Making Things Public – Atmospheres of Democracy*. Cambridge, Massachusetts: MIT Press, 2005.

Leroi-Gourhan, André. *Gesture and Speech*, trans. Anna Bostock Berger. Cambridge, Massachusetts: The MIT Press, 1993.

Newcorn, David. 'Cradle-to-cradle: the Next Packaging Paradigm?' 30 April, 2003, http://www.packworld.com/article-16013.

Nordhaus, Ted and Shellenberger, Michael. *Break Through: From the Death of Environmentalism to the Politics of Possibility*, Houghton Mifflin Company, 2007.

Rittel, Horst and Webber, Melvin. 'Dilemmas in a General Theory of Planning'. *Policy Sciences* (4), 1973, pp.155-169.

Ross, Andrew. *Strange Weather: Culture, Science, and Technology in the Age of Limits*, Verso, 1991.